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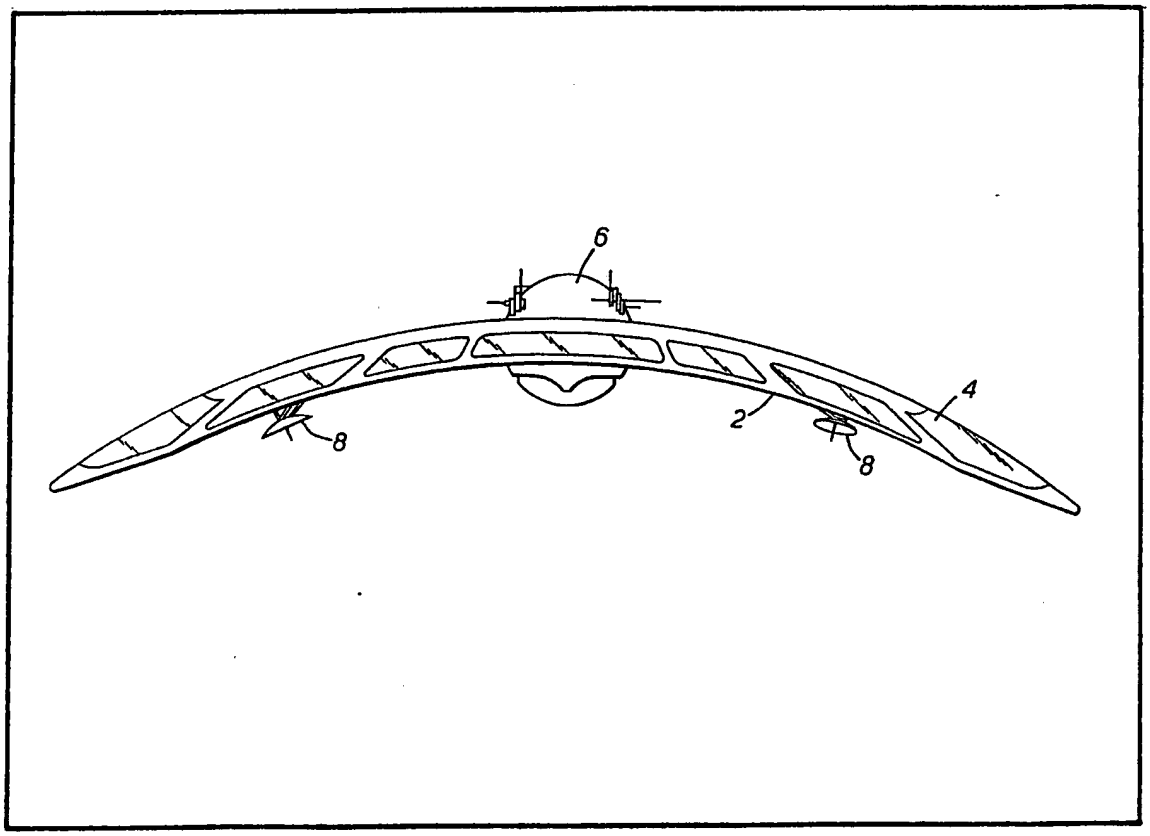
(54) **Airborne Relay Station**

(57) A lightweight airborne device which is adapted to maintain a position in the upper atmosphere, so as to act as a communication relay station. The power for maintaining the device in position is derived from the environment, e.g. by means of solar panels. The device may be lighter than air, or may have a dish-shaped wing 2 rotatable about a central hub 6 to generate lift. The wing may comprise metal or composite skins with foamed plastics filler having voids filled with a light gas.



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The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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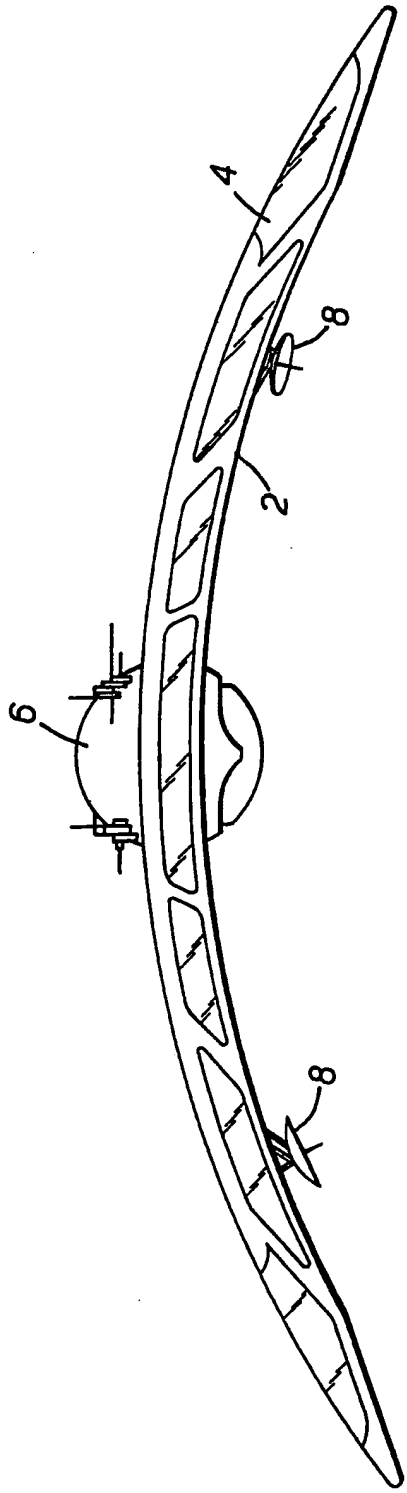

SPECIFICATION

Airborne Relay Station

This invention relates to airborne devices, and particularly to airborne devices useful in communications systems of the type in which a communications device is positioned sufficiently high above the earth's surface to act as a relay station for signals emanating from, and directed to, large areas of the surface.

One known type of relay station which is used at present is the satellite. "Geo-stationary" satellites are particularly suitable for communications purposes because they remain approximately stationary relative to a fixed point on the earth's surface, but they are very expensive to build and launch and extremely difficult to maintain because they must be positioned at a distance of about 22,000 miles from the earth.

According to the present invention, there is provided a lightweight airborne device which is adapted to maintain a stationary position in the atmosphere, relative to the earth's surface, by drawing power from its environment and using it to operate drive means to counteract shifts in position. The device is preferably adapted to operate as a telecommunications relay station.

By "lightweight device" I mean a device which is either "lighter than air" such as a balloon, or which is heavier than air but very lightly constructed, in the same way as a glider (for example), and includes aerofoil sections to generate lift. Preferably, the stationary position of the device, in use, is arranged to be well above cloud level and the power to operate the drive means is derived primarily from solar energy. For example, solar cells may be used to power an electric motor driving a propeller or fan, or ion or plasma jets.

Preferably the device includes an internal navigation system including a micro-computer which is adapted to monitor the position of the device relative to fixed points such as navigation satellites or ground stations, and to generate suitable control signals for the drive means. The device may be of such a configuration that the underside has a large area which acts as a reflector, or carries antennae for radio signals from ground stations while the upper parts of the device may carry solar power collectors.

Preferably, the device is arranged to be capable of returning to earth at intervals, for routine maintenance or alterations to its equipment.

A number of devices according to the invention may be arranged in an array to cover an entire country (for example) and they may be arranged to communicate with one another, for example using laser communication links.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing, which is a perspective view of a device according to the invention.

This drawing shows a device having a cross-section which is dished as shown at 2 to provide an aerofoil effect. The dish may be rotated continuously around a central hub 6 to provide lift (as in the case of a "frisbee") and is a light composite structure comprising a thin sheet metal (e.g. titanium), or carbon fibre reinforced plastics, outer skin with foamed plastic interior such as polyurethane. The structure may include voids containing a light inert gas to increase its buoyancy. Dish-shaped aerials 8 are used to relay signals between ground stations and may also be used to provide navigational signals for the device itself. The lower surface of the device may also be used as a radio signal reflector. The upper surface of the device carries solar panels 4 which collect power to drive motors for rotating the dish, or other mechanism for generating lift such as fans, or ion or plasma engines. The position of the device is controlled by a navigation computer housed in a central hub 6 connected to aerials which pick up signals from existing navigational satellites.

The device of the invention may also be used for crop surveying, meteorological or other surveillance purposes, prospecting, research safety and emergency services, navigational purposes and the like.

Claims

1. A lightweight airborne device adapted to maintain a stationary position in the atmosphere, relative to the earth surface, by drawing power from its environment to operate drive means so as to counteract shifts in position.

2. A device according to claim 1 including means for relaying telecommunication signals.

3. A device according to claim 1 or claim 2, including aerofoil sections to generate lift.

4. A device according to any preceding claim, which is adapted to operate by means of solar power.

5. A device according to any preceding claim comprising a generally saucer-shaped body adapted to rotate about a central hub.

6. A device according to any preceding claim including internal voids filled with a buoyant inert gas.

7. A lightweight airborne device substantially as herein described with reference to the accompanying drawing.

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